

**KING OF THE FERNS**

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**The Australian Staghorn Fern Experience**



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# Preface

## Early morning rainforest experience

Strolling through an Australian rainforest during the early morning, along a lush damp track, your runners becoming water-sodden within minutes, is an unforgettable experience that will soon be rewarded through the dappled light. It is a clear sunny day above the canopy; however, the thick vegetation below is still moist from the overnight dew and remains so throughout the day. Every shade of green is captivating as you appreciate the numerous species of ferns and other flora that share the rainforest. The rays of sunshine filtering through the canopy result in a survival-of-the-fittest amongst the tallest trees as they compete for light at the uppermost layer. The beauty of these rainforests is seldom forgotten and experiences like these can lead to an ongoing obsession.

Look up high into the enormous rainforest trees that create the canopy overhead and here is your reward: either a staghorn (*Platynerium superbum*) or elkhorn (*Platynerium bifurcatum*) clinging to the trees, growing naturally and in abundant numbers, depending on the conditions. As a general rule of thumb, the elkhorn enjoys the extremities of the forest with more light and sunshine while the staghorn is much more at home elevated within the denseness of the rainforest, enjoying the filtered sunlight and full humidity that the rainforest provides. The primary difference between the two *Platynerium* is that the *P. superbum* has a single rosette (bud) of foliage whereas the *P. bifurcatum* has

# Introduction

## Naming conventions and species

'Staghorn' is the common name of, a nickname for, and an expression of the majestic nature of this amazing species of fern, as is 'elkhorn' for the sympatric species. The terminology 'staghorn' and 'elkhorn' identifies the two separate Australian species. These commonly used names are derived from the American deer species because of the shape of their fronds: the elk is one of four species of deer, while the term 'stag' refers to a male elk. The aforementioned deer have palmate antlers that are displayed high and majestically above their heads, hence the nicknames of our staghorns with their antler-like fronds.



**Fig. 1** Stag (male) elk (left) and staghorn fern (right)



In countries other than Australia the elkhorn fern is simply referred to as a staghorn, and in some American states our staghorn (*Platycerium superbum*) is often referred to as a moosehorn fern in reference to the largest living member of the deer family, which has the largest set of antlers. Throughout this book, the terms 'staghorn' and 'elkhorn' may be used on occasions as alternatives to *P. superbum* or *P. bifurcatum*, their botanical names.

Staghorn ferns are from the genus *Platycerium*. The word *Platycerium* is derived from the Greek words 'platys' meaning 'flat' and 'keras' meaning 'a horn', referring to the shape of the staghorn's shield and fertile fronds. Botanically, the *Platycerium* genus consists of 18 known and documented species and is part of the Polypodiaceae family of ferns, but there are many more varieties, forms, cultivars and hybrids.

## ***Platycerium* clades**

*Platycerium* have been classified into clades depending on their morphological characteristics. Studies conducted during the past four decades by leading taxonomists (for example Hoshizaki, 1972; Hennipman and Roos, 1982; Hoshizaki and Price, 1990; Hoshizaki and Moran, 2001) generally agree that *P. superbum* resides in the Malayan-Asiatic sub-clade of the Asian-Australian sub-clade. The other known species found in our backyard, being *P. bifurcatum*, *P. hillii* and *P. veitchii*, have been identified as belonging to the Java-Australian sub-clade. Section 3 'The world of *Platycerium*' will concentrate on the descriptions, characteristics and locations of each of our species, including other forms found within Australia.

## **Where to find the elusive *P. superbum***

In Australia the *Platycerium* species are found growing naturally in tropical and sub-tropical rainforests as well as wet sclerophyll forests. There are close similarities between the three types of forest. The wet sclerophyll forests of Australia are predominantly along the coastal regions of New South Wales and south-east Queensland. They occur in high



**Fig. 9** Adult *P. superbum* with pendulous fertile fronds  
(Photo courtesy of Trevor Hathaway, Montville, Qld)

## The focus: *P. superbum*

*King of the Ferns* will focus specifically on the Australian *P. superbum* species and make reference to its different forms throughout Australia, being the 'standard' *P. superbum* from northern New South Wales and southern Queensland and the 'North Queensland' form found in the northern tropics of Australia. Comparisons will be made between examples of the *P. superbum* standard form, as it can appear either to have next to no stellate hairs or to be fully covered with them, depending on the environmental conditions. The book will also introduce the newest addition to the *P. superbum* family, the 'Cabbage' or 'Dwarf' form found in northern New South Wales, and uncover the facts about its discovery.

This book has not been written to supersede other *Platycerium* research conducted over many years or to contradict other books written on the subject. Rather, it has been produced to complement and enhance the writings of other authors and botanists on the *P. superbum*. While my intention is to explain the fundamental practices and processes of staghorn growth, cultivation and care in a way that the enthusiast can understand, I will also use some botanical terminology to describe and

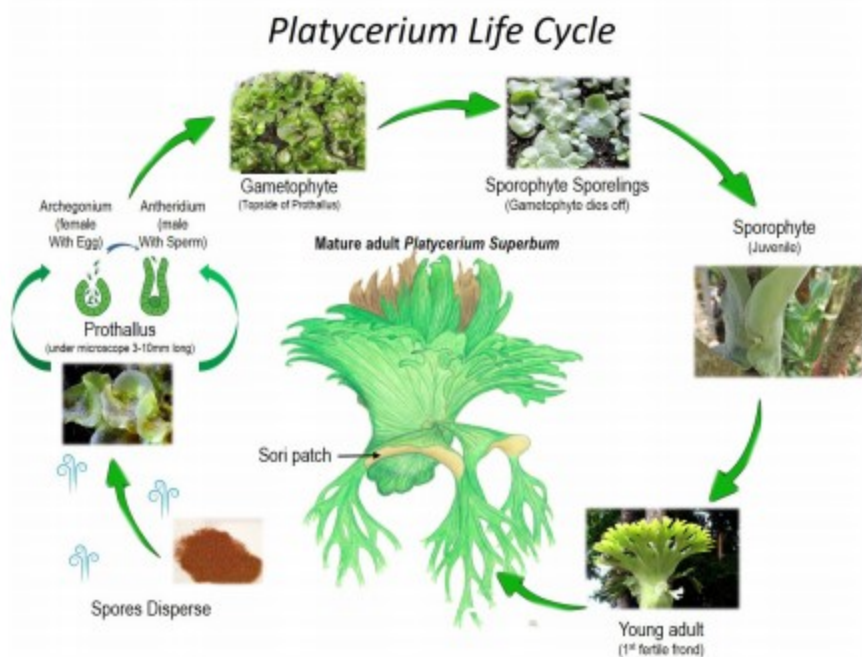
## CHAPTER 1

# Propagating spore: A Staghorn is born

### ***Platycerium* Cycle of Evolution**

*Platycerium*, being a fern species, reproduce sexually from spore, making their life cycle of evolution very different from that of other plants. In this section of the book we will move through each stage of their evolution, firstly, learning how to recognise each stage and secondly, discussing the different methods with which to care for them at each stage. Figure 10 on the following page is a high-level overview of the *Platycerium* life cycle that shows the sporophyte stage broken down into phases: sporeling, juvenile, young adult and mature adult. Being familiar with the terms used in this diagram will assist you in reading this and subsequent chapters.





**Fig. 10** *Platycerium* cycle of evolution  
(Sketch courtesy of Suzanne Cromb, Brisbane)

Table 1 below adds further context by explaining the indicators and timelines as each phase occurs throughout the *P. superbum* cycle of evolution. It should be noted that this is my opinion only and not necessarily that held by all botanists alike.

**Table 1** *P. superbum* life cycle

Stages in life cycle	Size / indication	Approximate timeline
Gametophyte	Carpet of minute, transparent, heart-shaped green leaves	4-24 weeks and onwards
Sporophyte	Commences with light-green leaves resembling small flags	6 months and onwards

## CHAPTER 2

# Infancy: Gametophyte to sporophyte

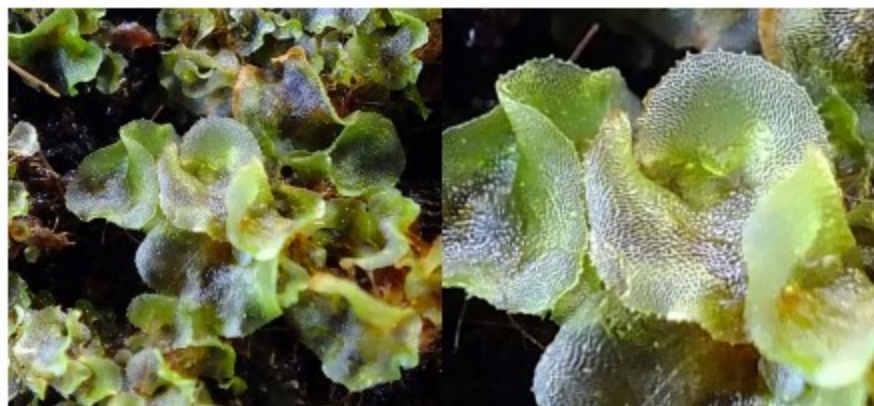
### Germination: the gametophyte stage

It will probably be anywhere between one and three months before you start identifying any sign of growth, although with warm, well-lit conditions germination can begin in less than one month. Refrain from lifting the lid during this period, as the sterilisation process will be spoiled by the external environment if air is allowed to enter the container. Because of the sealed container, the plantlets are living in a 'terrarium' that operates in the same way as a 'hothouse', with high humidity being the prime requirement at this stage. No additional attention is required now, as it is not immediately necessary to water the gametophytes.

You will start to identify lots of minute, transparent green leaves on the soil surface. The spore has now developed and has grown into a small green body called a 'prothallus'. This is the gametophyte (the sexual, or haploid) stage of the fern life cycle. The gametophyte contains a single set of chromosomes. Its purpose is to produce the male and female sex cells (gametes), the female of which, when fertilised, develops into a new sporophyte to continue the cycle.

On the prothallus will grow an archegonium (female) and an antheridium (male) with a number of rhizoids (root-like hairs) growing underneath. Fertilisation requires sperm cells to swim through a film of water on the prothallus from the antheridium and fertilise the female egg in the archegonium. If you are having trouble getting sporophytes to grow, try misting the gametophytes. If the humidity and temperatures are correct, the sperm will travel well and this process will occur relatively naturally.

Figure 16 below shows the prothallus under microscope after approximately four to five months. The prothallium develops from a germinating spore and has heart-shaped leaves typically 2–5 millimetres wide, with a number of rhizoids growing underneath. You can expect to see sporophytes emerging very soon after, and this is explained in subsequent paragraphs. The *P. superbum* has been declared to be one of the slowest and difficult *Platycerium* species to advance from gametophyte to sporophyte, so be patient.



**Fig. 16** *P. superbum* prothallus under microscope  
(Photos courtesy of Wayne Boyce, Albany, WA)

By this time, it is almost certain that your container may have become contaminated with mould, algae or other foreign plant matter. This is not really a problem, since if all goes well the ferns should have a decent head start on the algae. If the algae do start to become too intrusive,



## CHAPTER 3

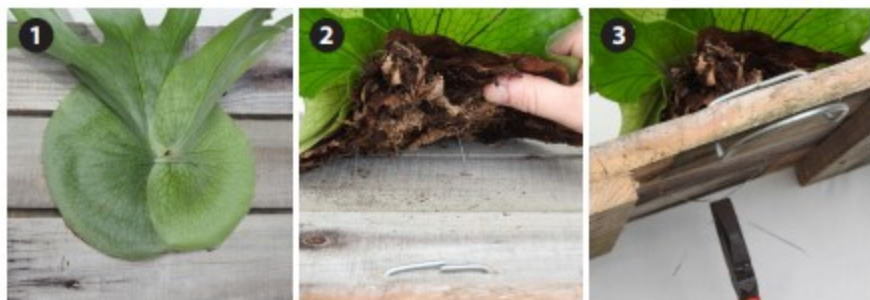
# The Juvenile

Hopefully your patience during the best part of six to eight months has now paid off, so within this chapter we will discuss the nurturing of the sporelings and how to develop them into healthy young juveniles. I use the term 'juvenile' to describe the young *Platyserium* once it is ready to be mounted onto a vertical surface or substrate. I described the sporeling stage during chapter 2, when the growth of the sporeling first appeared as little round discs around 10–15 millimetres in size.

After continuing to grow shields across its body, first from one side then the other, until it reaches approximately 150–180 millimetres in width, the sporeling will start to show the first glimpses of upward growth in the round shield fronds (an exciting time). The top of the small shield frond will develop small indentations in the upper leaf, and these indentations are the first signs of the shield frond dividing itself into fingers. These fingers will gather momentum quickly in an upwards direction, making a statement that it has reached juvenile status. Another good indicator of reaching juvenile status is when the sporeling has covered the extremity of its 150-millimetre pot, if it was relocated into a pot in chapter 1. At this stage you can be proud of your achievement with your propagation technique. Take a sigh of relief,



Using a pair of pliers, tighten the wire a few more twists and snip off the excess wire as seen in (photo 3).



**Fig. 34** Attaching the staghorn to the backing board

#### Step 4

Now that you have successfully secured the juvenile staghorn to the backing board, you have a good opportunity to add more growing medium, as shown in Figure 35 (photos 1 and 2). This ensures that the juvenile will have plenty of food to kick on with. The end result is a healthy looking juvenile with minimal damage that has a home for at least another five years.



**Fig. 35** Feeding the staghorn to commence growing in its new home

A quick alternative to the growing medium is to use sphagnum moss. If kept moist, it does provide a good growing medium for the roots to mesh and grow; however, it does have its negatives, being that if left to dry, it can harden, becoming impregnable and actually water-repellent.

## CHAPTER 10

# Problems and solutions

Staghorn ferns are relatively disease-free and have a low susceptibility to pests and diseases; however, neglecting an infestation if one does occur can quickly injure or destroy our staghorn. This is very rare, and in fact sick staghorn ferns are much more likely to have been troubled by incorrect growing conditions or care slip-ups, usually overwatering.

Monitoring your *P. superbum* should be a daily ritual; however, we all lead busy lives and it can be tempting not to maintain such vigilance. Nonetheless, monitoring your staghorns closely for any potential problems before they take hold is essential and will save you time, economic loss and stress. There are a few problems that are common among these epiphytic wonders and my intent in this chapter is to cover the worst of our enemies while providing some useful advice on the recommended treatments by which to control them, both by mechanical means and, if need be, by the use of insecticides.

The first three pests to be covered are fern scale, aphids and mealybugs, and although they are very different in their appearance, all three have commonalities. There is some evidence to suggest that ants are guilty of being vehicles for transporting these pests to our staghorns, and although this is not scientifically proven, it is a view held by many

experts. The bugs suck the sap from the fronds of the staghorn, then the ants return to harvest the sweet leftover product known as ‘honeydew’, as seen in figure 67. Ants are rarely seen on staghorns when there is an absence of fern scale, aphids or mealybugs.



**Fig. 67** Ants feeding on honeydew from scale insects  
(Photos courtesy of Keith Barlow, Grafton, NSW)

### **Fern scale (*Pinnaspis aspidistrae*)**

It is by no coincidence that potential disasters start with fern scale (also known as white scale or scale insect). Fern scale is categorised among the hard or armoured scales and belongs to the botanical family *Diaspididae*. The fern scale sucks the sap from the fronds, which weakens the fern’s ability to flourish. When the infestation is widespread, the scales will multiply in their thousands, firstly wilting and distorting the frond and eventually turning the frond yellow in colour. Staghorns that are young or unhealthy are far more susceptible to fern scale infestations, and young juveniles are at high risk of not surviving if the fern scale



bugs, shield bugs, pirate bugs and numerous other groups of common nursery pests and predators.’ (Manners 2016, p.1)

Aphids can appear in various colours, including green, orange, grey, brown and black, and they adapt to the environment in which they live. Figure 71 (photo left) shows a colony of brown aphids that have multiplied and made home on the underside of an adult *P. superbum* shield frond, while (photo right) shows a clever predator having a feast on aphids while not hindering the *Platycerium*.



**Fig. 71** Aphids feeding on the underside of *P. superbum* shield fronds

Aphids generally arrive around August to September, coinciding with spring. They especially enjoy the new shield and fertile frond growth and hide underneath these fronds for protection. They slowly suck the sap out of the staghorn fronds; this sap contains sugar, which the insects enjoy and digest. Some of the remnants of the sap oozes out onto the fronds of the fern and in turn attracts other insects, most noticeably ants. So, whenever you have ants crawling over your stags, chances are they are feeding on the sugar left over by aphids. Get rid of the aphids and chances are that you will rid the fern of ants as well.

If aphids are present, you will most likely observe a black mould-like substance appearing on the fronds. This is actually a fungus that grows on the sugar as a result of the aphids feeding.